IS THERE A SIGNIFICANT RELATIONSHIP BETWEEN THE USE OF SIMPLE EXPERIMENTAL METHODS AND IMPROVED SCIENCE LITERACY?: A CASE STUDY OF PGSD STUDENTS

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ABSTRACT

The purpose of which is clear presented For study This that is know correlations that exist in the implementation of the trial simple along with scientific literacy among PGSD students . The low score national science literacy as well as perception that science is difficult subject for student prospective teachers become background behind main he did study this . Research This use approach quantitative with design correlational against 53 samples first semester students selected 2025/2026 academic year through purposive sampling technique. Data collection was carried out in a way implementation questionnaire found from trial results simple as well as test scientific literacy that has been through validity and reliability tests . Researchers using descriptive statistics and inferential statistics as technique data analysis through testing correlation Pearson product moment. Based on the design that has been determined , then found results existence contribution active students who improved on the experiment simple which is in numbers (50%), while the average score student scientific literacy reached 80.32. The results of the hypothesis test showed a significance value of 0.001 < 0.05 with a correlation coefficient of 0.990. This proves a very strong positive relationship, which means that the higher the intensity of the use of simple experimental methods, the higher the scientific literacy of PGSD students. This finding confirms that simple experiments can be a strategic solution for teacher-producing institutions in improving the quality of scientific literacy of prospective educators without relying on the sophistication of laboratory facilities.

Keywords: Simple Experiment, Science Literacy, PGSD Students

A. Introduction

As time goes by time, current globalization the more strong give influence on life human, thing this demand source Power man more can useful and capable face increasingly advanced technology sophisticated. In context mentioned, scientific literacy is part of from implementation competence essential that is as existence important can give help to individual in understand phenomenon nature, solving problems, and take decision based proof in life daily

(Fuadi et al., 2020; Irsan, 2021; Situmorang, 2016). Scientific literacy is not only related with mastery scientific concepts, but also includes ability use knowledge the For explain phenomena, evaluate information scientific, and attitude critical to various science and technology issues developing in society (Sutrisna, 2021; Zahro et al., 2019) .

In a way internationally, scientific literacy ranks role crucial to assess quality education based on draft from *Programme for International Student Assessment* (PISA), in the form of a group from method science work, context, insight until characters that show attitude towards science (Pratiwi et al., 2019). However, the results of PISA 2022 show necessary conditions become attention. Although Indonesia's ranking has experienced improvement from position 71 in 2018 to 67 in 2022, score scientific literacy instead experience decline from 396 to 383 (OECD, 2023). The decline score the indicates that ability participant educate in apply concepts of science and thinking critical to problem scientific still not optimal, showing if implementation from understanding for mastering science encourages for mingle with theory that is not stand alone.

Problems found no only about involvement participant educate, but also need seen from aspect readiness prospective teachers as facilitator learning. Through student focused references from the Primary School Teacher Education (PGSD) study program has crucial existence in support implementation of the science mindset has There is since early (Limiansih & Susanti, 2021). At the level school basic, ability think scientific start implanted through meaningful science learning (Fazilla, 2016). Therefore that, PGSD students do not Enough only understand science concepts, but also need own sufficient scientific literacy to be able design and implement contextual learning as well as based on scientific processes.

However thus, the background behind academic diverse PGSD students often bring up perception that science is eye difficult and identical lessons with activity complex laboratory. Based on observation beginning in the lecture process, the ability student scientific literacy Still classified as low, which is visible from difficulty in analyze material as well as

explain phenomenon in a way scientific. This situation has the potential to lead to misconceptions and impact suboptimal science learning in elementary schools. If prospective teachers lack scientific literacy, science instruction risks reverting to memorization of concepts without providing authentic scientific experiences for students.

One alternative that supports the development of students' scientific knowledge is implementing simple experiments while studying science. This approach can encourage students to actively contribute to scientific studies that involve hands-on experience using readily available tools and materials (ML Sari et al., 2021). Through these activities, students not only gain a more concrete understanding of concepts but also learn to observe, classify, predict, and draw conclusions based on evidence (Leba et al., 2023). Besides being relevant to the characteristics of science learning, this approach is also suitable for elementary schools, which generally have limited facilities (Nurwulandari, 2018; Pratika et al., 2025). Thus, simple experiments have the potential to be an effective strategy for fostering scientific literacy while preparing students as future professional teachers.

Various studies have shown that both STEM approaches and simple experiments can improve students' scientific literacy (Jayanti & Nurfathurrahmah, 2023; Leba et al., 2023; Yuliati & Saputra, 2019). However, studies specifically examining the relationship between simple experiments and scientific literacy in pre-service teachers are still limited. This is despite the fact that elementary school teacher education students hold a strategic position in shaping students' scientific literacy from elementary school onward. Therefore, this study focuses on empirically testing the relationship between simple experiments and elementary school teacher education students' scientific literacy as an effort to contribute to strengthening science learning in higher education.

In accordance with the review above, it shows that there are desired achievements to realize understanding that includes correlations from simple experiments and science literacy targeted to research subjects, namely students from PGSD. It is hoped that the

findings obtained can serve as a foundation for the development of more contextual and meaningful science learning strategies in preparing prospective teachers who have good science literacy.

B. Research Methods

Researchers in a way details want to reveal the analyzed data in detail, so that through method quantitative become strategic bridge, assisted by design supporting correlation strengthening results findings. This design aim for know there is or whether or not connection between implementation experiment simple in science learning with the scientific literacy of students in the Elementary School Teacher Education (PGSD) Study Program. This study did not involve special treatment or a control group, but instead examined the relationship between variables based on the learning conditions under which they took place.

The study was conducted on first-semester elementary school teacher education (PGSD) students in the 2025/2026 academic year. Subjects were selected through *purposeful sampling,* namely students who had participated in simple experiment-based science learning. The total sample size was 53.

The variables used consist of the independent variable (X), namely the application of simple experiments in science learning, and the dependent variable (Y), namely students' scientific literacy. Simple experiments in this study are operationalized as science learning activities that involve observation activities, experiments using simple tools and materials, data collection, and drawing conclusions based on the results of the experiments. Scientific literacy is measured based on indicators of the ability to explain scientific phenomena, evaluate and design scientific investigations, and interpret scientific data and evidence.

The research instruments consisted of a simple experiment implementation questionnaire and a scientific literacy test. The questionnaire was designed using a *Likert scale* to measure students' perceptions of their involvement in simple experimental activities. Meanwhile, the scientific literacy test can be designed with questions such as a, b, c, d, and so on, and questions covering scientific literacy indicators.

Before use, the instrument's validity was tested through *expert judgment* and empirical validity tests. Then, reliability was tested through the existence of *a Cronbach's Alpha coefficient.*

Data collection techniques were carried out by administering questionnaires and scientific literacy tests to students after the learning process had taken place. After obtaining the required data, an in-depth study was conducted using descriptive statistics containing various results from predetermined variables, as well as inferential statistics to test the research hypothesis. Prerequisite analysis tests included a normality test. The relationship between variables was tested using *the Pearson Product Moment correlation test* . The SPSS system helped to concretely analyze the data obtained with a significance level of 0.05.

The following classification contains research hypotheses, including:

H_0: There is no significant relationship between simple experiments and the scientific literacy of PGSD students.

H_1: There is a strong correlation found from the results of simple trials and scientific literacy in research subjects, namely PGSD students.

C. Research and Discussion Results

Study This implemented on 53 PGSD students with objective for analyze correlation between method experiment simple to ability Student science literacy. Implementation questionnaire has become bridge for get the required data, through experiment simple as well as design questions passed for see ability scientific literacy. The following is a presentation of the data contained in Table 1.

Table 1. Data from the Student Experiment Implementation Questionnaire Results

Category	Score	Percentage (%)
Very good	x ≥ 67	4
Good	54 ≤ x < 67	38
Enough	42 ≤ x < 54	50
Not enough	29 ≤ x < 42	6
Very less	x < 29	2

Table 1 visualizes the results data questionnaire implementation experiment student with very good category as much as 4%, category Good as much as 38%, category Enough as much as 50%, category not

enough as much as 6%, and the very poor category is 2%. Based on the results of the data questionnaire descriptive state that involvement PGSD students in implementation experiment simple can categorized enough. In addition, it is also given test for obtained data on student scientific literacy which is presented in table 2.

Table 2. Test Student Science Literacy

Data	N	Minimum	Maximum	Average	Standard Deviation
Test Science Literacy	53	68	90	80,3208	5,16189

It has been explained existence mark below average and above from the average, namely start from scores of 68 to 90. Moving on to the science literacy test score of 53 PGSD students, the score was 80.3208 with a standard deviation of 5.16189. The test data was then subjected to a product-moment correlation hypothesis test, but before that, a normality test was needed to determine the normality of the research data distribution. The following displays the scores obtained directly in Table 3.

Table 3. Normality Test

Data	Sig. (Kolmogorov-Smirnov)	Information
Test Score Science Literacy	0.200	Normal

Outline from the table describe existence findings from implementation of Kolmogorov-Smirnov which shows that the data has been distributed normally through the number 0.200 > 0.05. After the prerequisite test fulfilled , then will to be continued with testing hypothesis namely the product moment analysis test (Wiradarma et al., 2021). The product moment correlation test is technique data analysis used by researchers for know connection both variables (Shidik, 2020). The following test results are described in Table 4.

Table 4. Product Moment Correlation Test

Correlations			
		Questionnaire	Mark
Questionnaire	Correlation Coefficient	1,000	.990 **
	Sig. (2-tailed)	.	<,001
	N	53	53
Mark	Correlation	.990 **	1,000

	Coefficient		
	Sig. (2-tailed)	<,001	.
	N	53	53

Table 4 shows the significance value of the questionnaire variable and test score of 0.001 < 0.05, meaning that the simple experiment variable and students' scientific literacy have a relationship or correlation. In table 4 there is also a *correlation coefficient value* on the experiment implementation questionnaire and the scientific literacy test score of 0.990 with the degree of relationship between these two variables being highly correlated and the form of the relationship between these two variables is positive, meaning that the higher the student's involvement in the implementation of simple experiments, the higher the student's scientific literacy.

The simple experimental method functions as a cognitive instrument that transforms declarative (theoretical) knowledge into procedural (practical) knowledge. This method maximizes the use of everyday tools familiar to students (WW Sari & Zumrotun, 2025), thereby reducing anxiety levels for non-pure science students (Chen et al., 2020) and making students more daring to explore without fear of damaging expensive laboratory equipment (Prestado et al., 2025). Furthermore, simple experiments provide a direct visualization effect of abstract scientific concepts (Banda & Nzabahimana, 2021).

Theoretically, these findings reinforce the constructivist view that states that knowledge will be durable if built through sensory experiences and direct manipulation of objects (Novak & Schwan, 2021). There are three main dimensions in the context of scientific literacy that can be built: the content dimension related to understanding the laws of science, the process dimension related to training scientific process skills, and the attitude dimension related to fostering curiosity and objectivity (Çelik & Doğru, 2024).

High scientific literacy in prospective teacher students is a prerequisite for producing quality science learning in elementary schools. Mastery of simple experimental methods provides creative provisions for students to overcome limited laboratory facilities

in elementary schools, especially in riverbank areas or remote areas (Tako et al., 2020). The capabilities possessed by students in the experiments carried out are easy to understand in viewing science in a simple way through existing events. This is based on experiments that are still understandable by the age of elementary school children, demonstrating a real manifestation of pedagogical and professional competence (Bitzenbauer & Meyn, 2021). Therefore, the positive correlation in this study confirms that the orientation of science lectures in PGSD must continue to be encouraged towards an applicative and contextual hands-on activity approach (Maftuh et al., 2023).

The findings of this study indicate a significant correlation between simple experimental methods and students' scientific literacy skills, and this is consistent with previous research emphasizing the importance of inquiry-based learning. Furthermore, a clearer view from (Verlicya et al., 2025) suggests that the implementation of simple experimental innovations in elementary schools has a positive impact on improving students' scientific literacy, skills, and environmental awareness. Students' initial interest and understanding of science can be fostered through a learning process that integrates a simple experimental approach (Tan et al., 2026). Implementing simple experiments outlined in the scientific literacy learning system provides a foundation that has been proven to influence students' science learning outcomes (Jumrah, 2021).

Experience-based learning with a simple experimental approach can develop students' scientific literacy skills (Fauziah et al., 2022; Leba et al., 2023; Ndun et al., 2025; Octaviani et al., 2023; ML Sari et al., 2021; Supriatin & Anita, 2022; Thoriq et al., 2024). These results prove that scientific literacy is not always correlated with sophistication facility laboratory, but rather more on the accuracy of the reasoning process scientific research conducted during experiment ongoing. Findings this support perspective that scientific literacy for PGSD students are multidimensional in harmony with results findings that have correlation clear through description that understanding learning mastered scientific literacy with well, in general

full depends experience applicable learning.

Study This become give proof empirical new as well as strengthen correlation that method experiment simple can become solution practical for institutions teacher printer for increase standard scientific literacy of its graduates without must constrained by limitations infrastructure. Integration between findings moment This with research previously confirm that strengthening scientific literacy must started from repair method student - centered instruction.

D. Conclusion

It is clear found from results analysis through testing techniques for prove the data is relevant, to be something the thing that answers in a way comprehensive that can concluded that implementation method experiment simple with ability PGSD students' scientific literacy has connection strong between both. This method has proven effective as a cognitive instrument that bridges theoretical understanding into procedural practice, while also being able to reduce science anxiety through the use of contextual everyday tools and materials. This correlation confirms that the quality of scientific literacy does not absolutely depend on the sophistication of laboratory facilities, but rather on the accuracy of the scientific reasoning process and the active involvement of students in the investigation. Thus, strengthening simple experiments is a strategic solution in building the pedagogical and professional competencies of prospective teachers so that they are ready to deliver quality and meaningful science learning, even in conditions of limited infrastructure in elementary schools.

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